

Economics Behind Capacity Construct

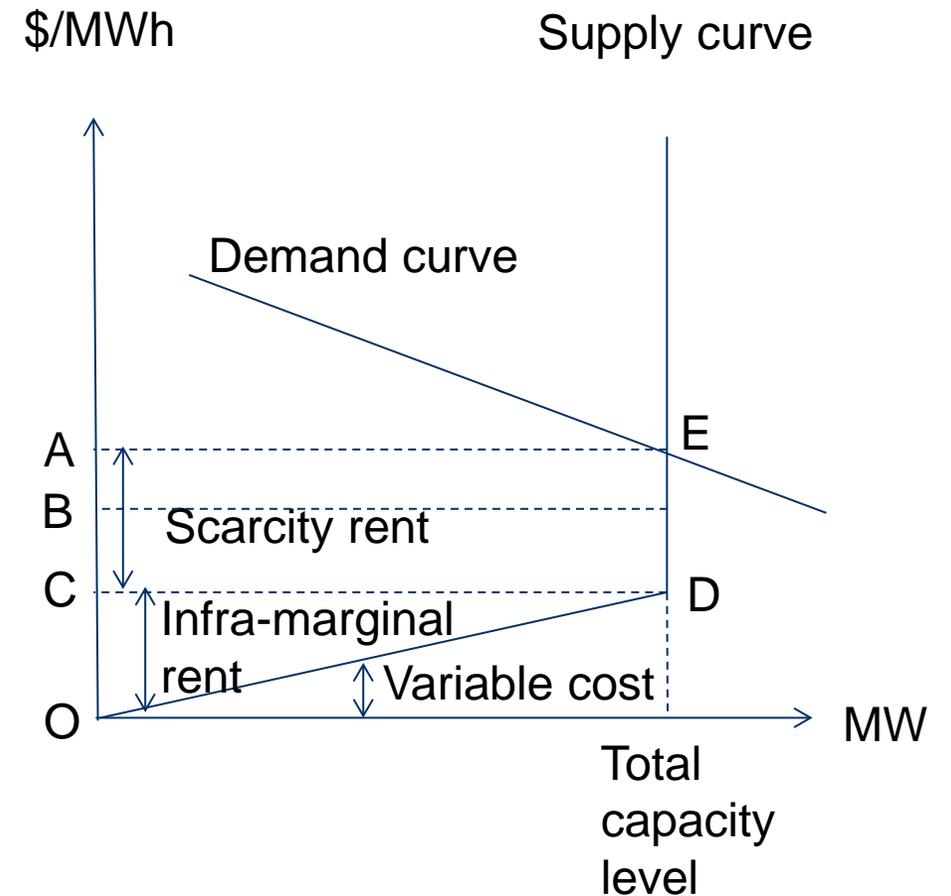
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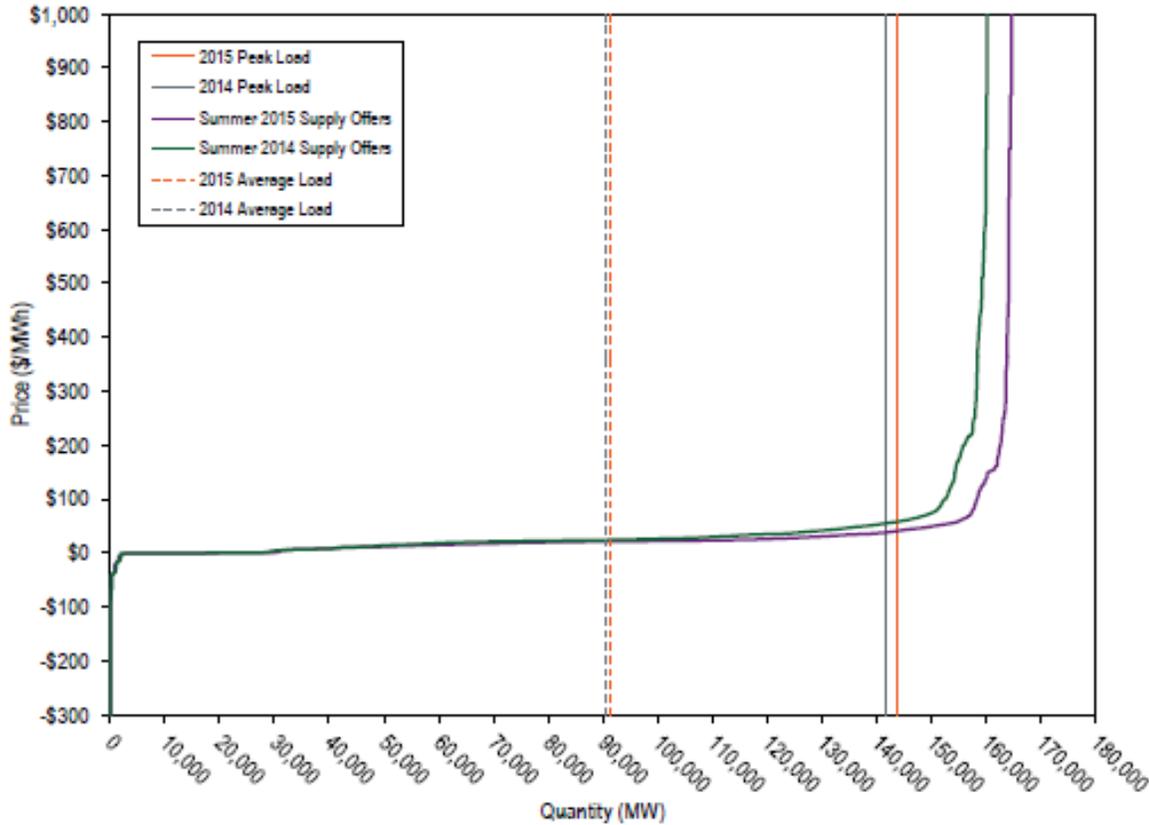


- Underneath the apparent stability, the PJM market construct has been undergoing a significant transition
- Declining energy prices have raised broad concerns
- Current trend, if continued, could make it harder for existing suppliers to stay in business or new investors to enter the market
- State actions have been triggered and added further uncertainties
- A quick tour of market price formation starting at its economic foundation could help better understand the issue

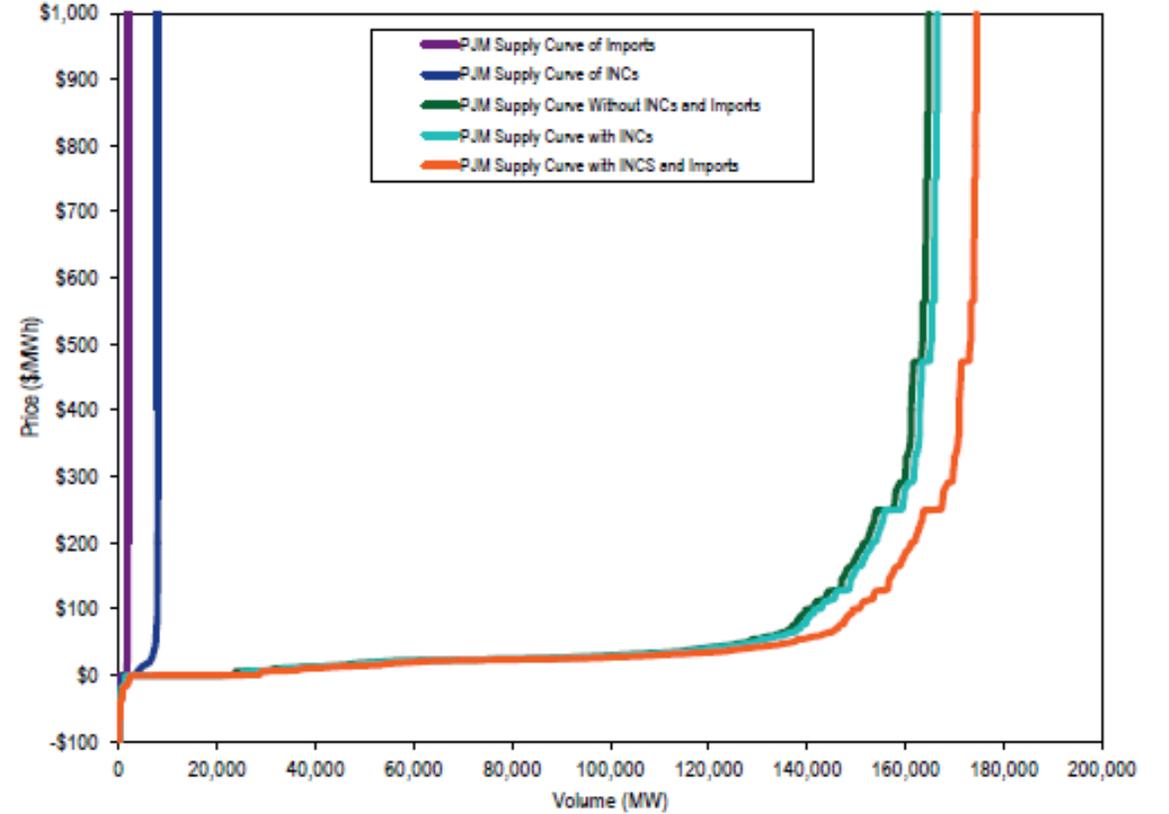
- The market price is formed when the demand and the supply meet (E) where the marginal willingness-to-pay equals the marginal cost of production
- Efficient price formation is achieved when the price (A) is equal to the sum of marginal cost (C) and scarcity rent
- The scarcity rent is zero when the demand is low and becomes positive when the demand is constrained by the available capacity
- The sum of scarcity rent and infra-marginal rent is called the net energy revenue
- Price cap (B) reduces the net energy revenue --- the “missing money” problem



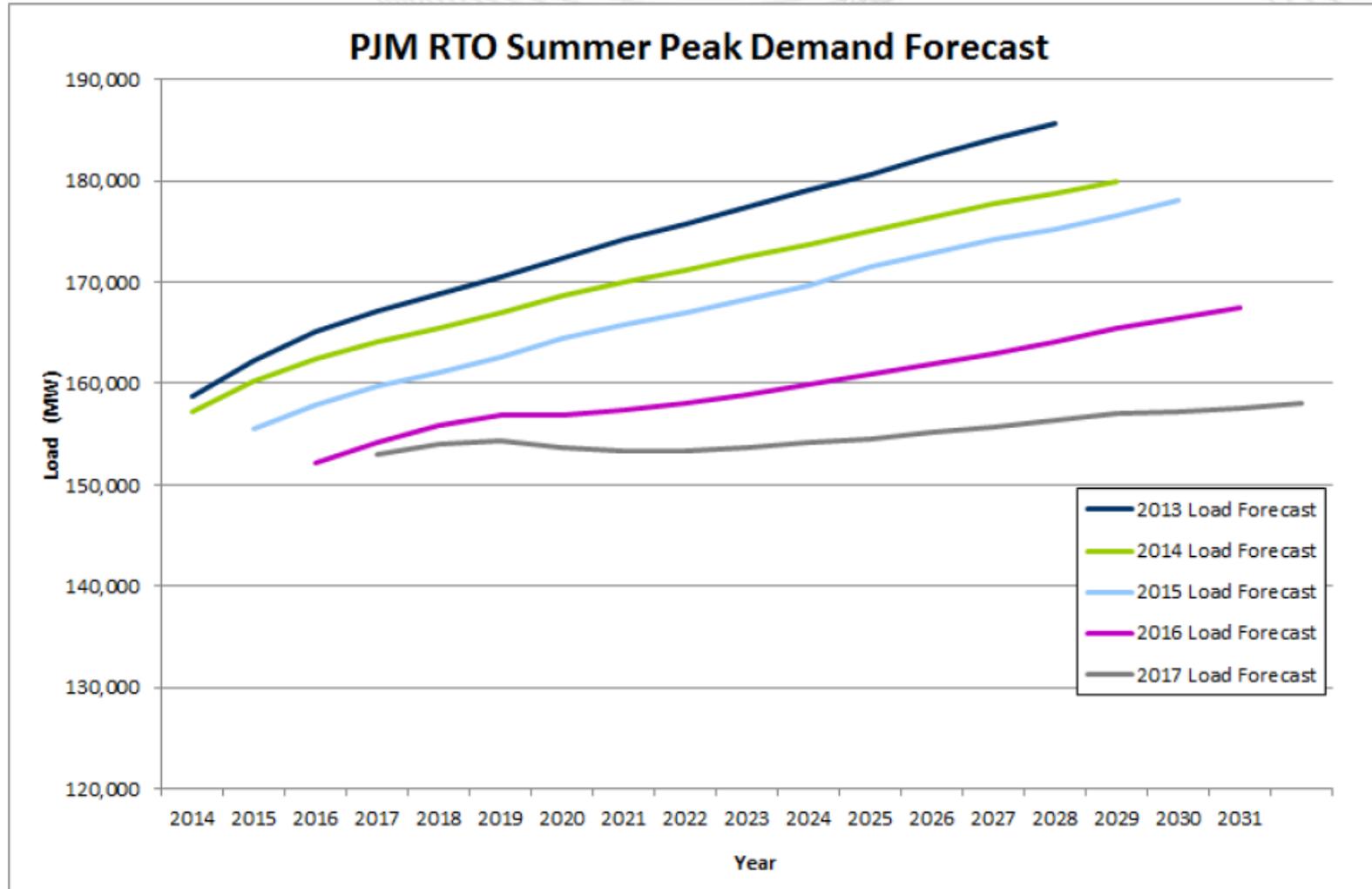
Real-time energy market



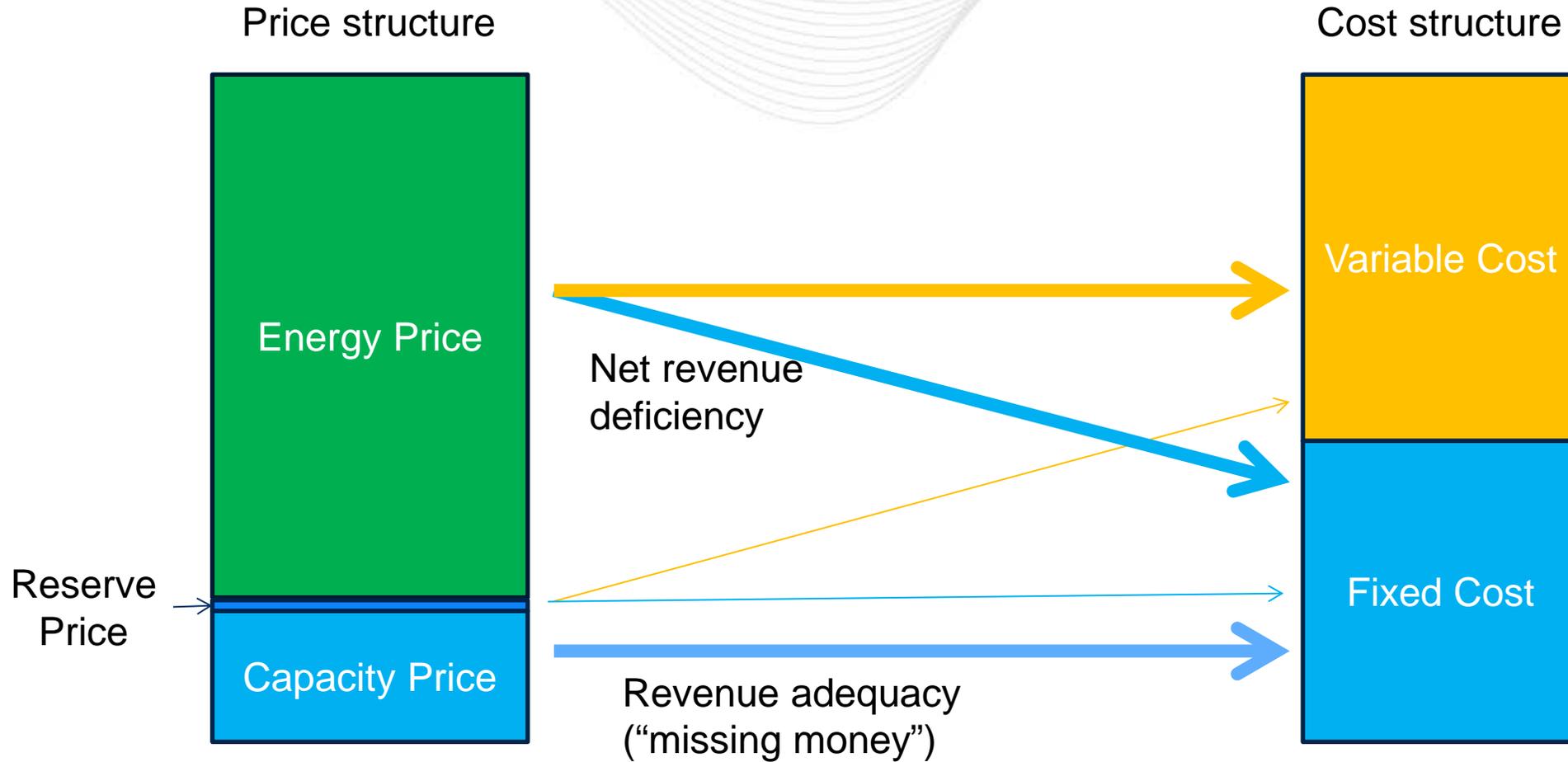
Day-ahead energy market



Source: Monitoring Analytics, LLC. *2015 State of the Market Report for PJM*, Volume 2, March 10, 2016



How market prices recover resource costs



- At least conceptually, capacity could be conceived as an option contract with a strike price for a specified quantity callable at that price
 - For example, an offer may include a pair of prices: a capacity price (\$/MW) and a callable energy price (\$/MWh)
 - Analogous to forward reserve product
- A resilient portfolio may include forward capacity (or reserves) and energy contracts
 - LSEs and suppliers may insure each other against price volatility in spot markets

- Capacity market was created to achieve resource adequacy and revenue sufficiency
- Revenues from energy and capacity markets are essential to support resource investments
- State actions present a challenge to market price formation
- Resilient market construct built on sound economics could better support efficient price formation in the long run